

# **INSTRUCTION MANUAL**

**ULTRASONIC POWER SUPPLY**

**MODEL E-150B**

**IMPORTANT SERVICE LITERATURE**

**Forward to Your Service Department.**

**BRANSON**  
**BRANSON ULTRASONICS CORPORATION**  
Eagle Road Danbury, CT 06810-1961 (203) 796-0400

## MANUAL CHANGE INFORMATION

At Branson, we continually strive to keep up with latest electronic developments by adding circuit and component improvements to our equipment as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't incorporate these changes immediately into printed manuals. Hence, your manual may contain new change information. Change information, if any, is located in the Appendix.

Branson Sonic Power Company equipment is manufactured under one or more of the following U.S. patents:

3,328,610	3,469,211	3,586,122	3,666,599	3,764,442	3,873,859
3,378,429	3,483,066	3,586,589	3,666,602	3,785,910	3,917,146
3,384,284	3,489,241	3,601,084	3,679,526	3,790,059	3,920,504
3,394,274	3,489,930	3,602,421	3,697,357	3,791,569	3,921,015
3,421,939	3,491,250	3,607,580	3,698,408	3,808,080	3,939,033
3,432,691	3,493,457	3,608,648	3,699,719	3,813,006	3,945,618
3,440,118	3,524,085	3,614,484	3,721,833	3,813,021	3,946,280
3,441,875	3,526,792	3,619,671	3,734,805	3,833,163	3,955,740
3,443,130	3,529,660	3,628,071	3,737,361	3,848,792	4,006,707
3,464,102	3,561,462	3,645,504	3,752,380	3,852,144	4,016,436
3,468,731	3,573,781	3,649,420	3,752,381	3,863,826	D 225,110

Processes described in this publication are covered by one or more of the following U.S. patents:

3,224,916	3,401,446	3,499,808	3,595,453	3,966,520
3,284,257	3,440,117	3,526,554	3,765,973	3,969,544
3,331,719	3,440,118	3,563,822	3,893,223	3,972,758
3,367,809	3,468,731	3,577,292	3,899,116	3,981,759

# **WARNING**

**READ BEFORE INSTALLING OR  
USING THE EQUIPMENT**

**FOR SAFETY OF OPERATING PERSONNEL, OBSERVE THE FOLLOWING WARNINGS:**

## **INSTALLATION/SETUP**

1. Make sure that the equipment is properly grounded. Do not operate if it is not.
2. Never use the equipment with a footswitch or single start switch unless the point of operation is protected.
3. Never use the TW-1, TW-2, or TW-3 converter without the hand gun. A shock hazard could exist if a converter is used alone.
4. Any unauthorized modification of the control circuitry or wiring in the unit may cause a malfunction which could result in injury to operating personnel.
5. No safeguard, safety appliance or device attached to or forming an integral part of the equipment shall be removed or made ineffective except for the purpose of making immediate repairs or adjustments. After repair or adjustment, all safety devices must be replaced before the equipment is operated.

## **OPERATION**

- 1 Do not put any part of your body under the tip during operation. High pressure and ultrasonic vibrations can cause severe and permanent injury.
2. Do not touch the tip when the equipment is operating. Ultrasonic vibrations can burn the skin if pressed against a vibrating horn.
3. Do not operate equipment with the cover(s) open. High voltage is present within the equipment when connected to plant wiring.
4. When large plastic parts are welded, they may vibrate at a frequency within the human hearing range at a sufficiently high intensity to warrant the wearing of ear protection by the operator. Use of other noise reduction methods or redesign of the workpiece may also be necessary.

## **MAINTENANCE**

1. Any safeguard, safety appliance, or device removed or made ineffective during the repair or adjustment of the equipment must be replaced immediately upon the completion of such repair or adjustment.
2. Do not operate equipment until repairs and adjustments have been made and the equipment is in good working condition.

## **MATERIALS**

When being processed, certain plastic materials may emit toxic fumes and/or gases hazardous to an employee's health. Where such materials are processed, proper ventilation of the work station is required. Inquiry should be made to the U.S. Department of Labor concerning OSHA regulations for a particular plastic prior to processing with ultrasonic equipment. **NOTE: Processing of PVC materials can be hazardous to an operator's health.**

-continued-

## WARRANTY

When used in accordance with written instructions and under normal operating conditions, Branson Sonic Power Company (BRANSON) equipment is guaranteed to be free from defects in MATERIAL and WORKMANSHIP for one (1) year from the date of original delivery by BRANSON or by an authorized representative. Any unit which proves defective during the stated period will be repaired free of charge or replaced at the sole discretion of Branson Sonic Power Company, F.O.B. Danbury, Connecticut, or an authorized repair station as advised by BRANSON, provided the defective unit is returned properly packed with all transportation charges prepaid. A limited warranty as specified may apply to certain components of the equipment.

## WARRANTY EXCEPTIONS

The warranty will become void if the equipment is used for applications requiring metal-to-metal contact.

This warranty shall not apply to equipment subjected to misuse, improper installation, alteration, neglect, accident or improper repair.

This warranty is limited to the original purchaser and is not transferable.

Tips fabricated by Branson for use in equipment described in this manual are manufactured to exacting parameters and tuned to vibrate at 20,000 Hz. An improperly tuned tip can cause undue stress or damage to the converter and power supply. The warranty may become void if the equipment is used with such tips. Contact your Branson representative or Branson Sonic Power Company, Danbury, Connecticut, should you have any questions concerning tip qualification.

No warranties expressed or implied have been made other than those stated herein. BRANSON HEREBY DISCLAIMS ANY WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Questions relating to warranty or repairs in the continental United States should be addressed to Branson Sonic Power Company, attention: Repair Department, or the nearest Branson Sonic Power Company sales office. In countries outside the United States, please contact the local Branson sales office or authorized representative.

## IMPORTANT NOTICE

The success of welding an article by the user of the BRANSON ultrasonic welder depends upon many situational factors including pressure, weld time and hold time of the welder, joint design, dimensions and composition of the parts. Any of these factors may change during production of articles.

BRANSON recommends that articles welded, and especially those intended for critical or life supporting medical applications, be carefully inspected and tested after welding to assure their soundness and suitability for use for their intended purpose.



# MODEL E-150B POWER SUPPLY

## INSTRUCTION MANUAL

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Manufacturers of Hearing Protectors  
Manufacturers of Sound Absorbing Material

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## INSTRUCTION MANUAL

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SECTION I  
GENERAL INFORMATION

1-1 PURPOSE OF MANUAL

This manual contains operation and service instructions for the Ultrasonic Power Supply, Model E-150B.

1-2 PURPOSE OF EQUIPMENT

The E-150B is a reliable 20 kHz ultrasonic generator, designed to supply up to 150 electrical watts to a TW type converter. Convenient size, reliability, and ease of operation make this unit well suited for production line use as well as laboratory or field applications.

NOTE

*Hereinafter, the E-150B will be referred to as the power supply.*

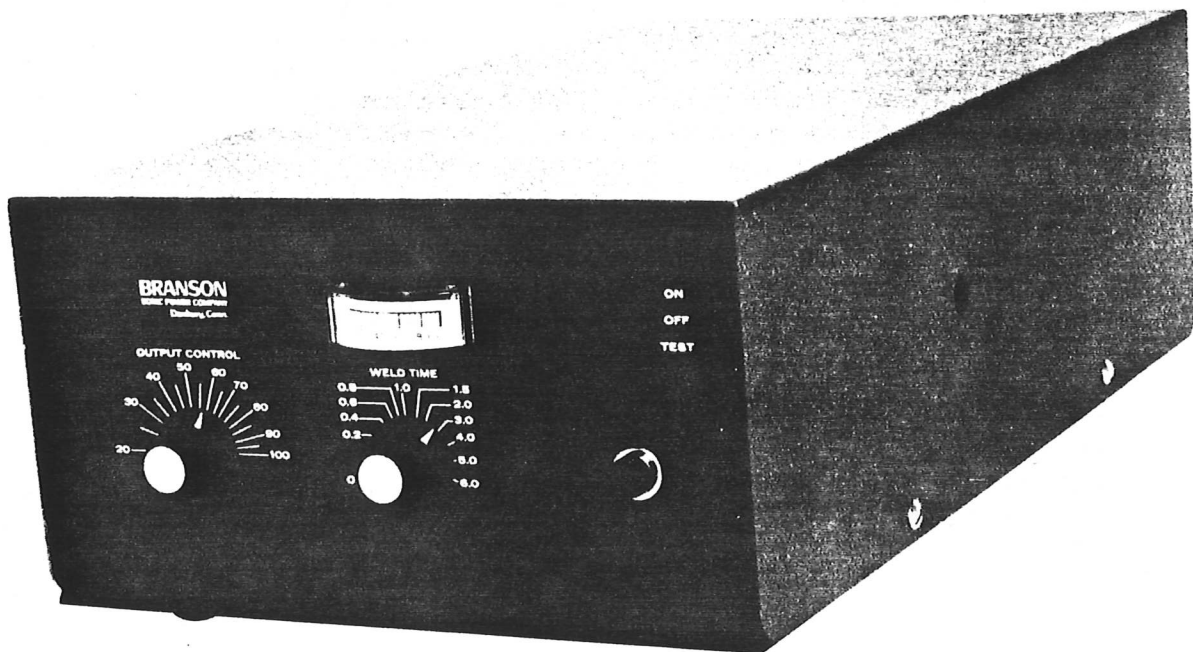


Figure 1-1 Model E-150B Power Supply Photograph

### 1-3 CHARACTERISTICS

Power requirements:	100V*, 117V, 210V*, 230V*, and 250V*
Output Power:	150 electrical watts to converter
Frequency Output:	20 kHz
Output Amplitude:	Variable 50% to 100%
Weld Time Control:	0.1 to 6.0 seconds
Hold Time:	Fixed at 0.3 seconds
Converter Compatibility:	TW-1, TW-2, and TW-3
Converter Duty Cycle:	<u>50% maximum</u>
Dimensions:	Height: 5½" (14cm) Width: 5-5/8" (24.5cm) Depth: 18" (46cm)
Weight:	19 lbs. (8.5kg)

### 1-4 PRINCIPLE OF OPERATION

The power supply converts conventional A.C. line current to 20 kHz electrical energy. This high-frequency electrical energy is fed to a converter where it is converted to mechanical vibrations. The heart of the converter is a lead zirconate titanate electrostrictive element which, when subjected to an alternating voltage, expands and contracts. The converter vibrates in a longitudinal direction and transmits these vibrations to the workpiece.

### 1-5 DESCRIPTION OF OPERATION CONTROLS, INDICATORS AND CONNECTORS

Each control, indicator or connector is assigned an index number for reference. Table 1-1 lists the controls, indicators and connectors in the order of index number, describes the type of device indexed, and gives a brief description of the function of each.

\* Export model



TABLE 1-1. FUNCTION OF CONTROLS, INDICATORS, AND CONNECTORS

Index No.	Device	Function
1	Loading Meter	Indicates level of ultrasonic power transmitted to horn.
2	ON-OFF-TEST Switch	ON position - energizes power supply OFF position - de-energizes power supply TEST position - allows tuning of the power supply
3	Power on/off Indicator	Indicates when power supply is on.
4	WELD TIME Control	Sets duration of ultrasonics (0.1 to 6.0 seconds).
5	OUTPUT CONTROL	Controls the amplitude of ultrasonic vibrations. Clockwise rotation increases amplitude.
6	Tuning Control	Tunes power supply to horn.
7	6 Pin Connector	Actuator Start Switch
8	3 Pin Connector	Sonics Trigger Switch
9	7 Pin Connector	Connects power supply to converter, actuator, or HG 152 Hand Gun.
10	Power Cord	Connects power supply to electrical outlet.
11	4 Amp Fuse	Overload protection

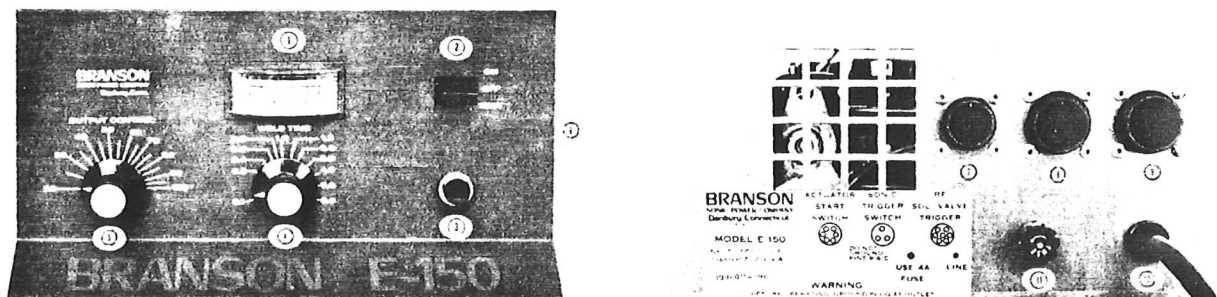


Figure 1-2 Location - Controls, Indicators and Connectors

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## SECTION 2 INSTALLATION

### 2-1 UNPACKING AND HANDLING

Normal precautions in unpacking and reasonable care in handling should be exercised to avoid possible damage to the unit. A visual inspection of all external controls, indicators and surfaces should be conducted to detect any damage which might have occurred during shipment.

#### NOTE

*The shipping company is responsible for damage to equipment during shipment. If damage has occurred, notify shipping company immediately to establish proper basis for claim.*

Fill out and return warranty card to Branson Sonic Power Company.

### 2-2 POWER REQUIREMENTS

The power supply requires a single-phase, three wire, 50/60 Hz source.

#### NOTE

1. *To determine voltage requirements, check label at rear of unit, and measure line voltage.*
2. *If necessary, adjust tap on transformer T4. (Export model)*

### 2-3 PLACEMENT OF EQUIPMENT

A fan maintains safe operating temperature in the power supply by circulating air over the components. Therefore, the unit must be placed so that the air intake and exhaust is not blocked. If the internal temperature of the power supply becomes excessive, a thermal cutout switch will disconnect the power and keep it disconnected until the unit cools to a safe operating level. Although the unit will automatically be re-energized, it should be checked to determine the reason for the initial cutout. Periodically check the air intake and exhaust to ensure that dust or dirt is not restricting the flow of air.

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SECTION 3  
PRELIMINARY SETUP

Following are the most common usages for the E-150B power supply.

3-1 USE WITH HG-152 HAND GUN

When the power supply is used with the HG-152 Hand held Spot Welder, connect the HG-152 to the 7 pin connector on the power supply.

For principle of operation, see Page 5-4.

3-2 USE WITH ACTUATOR AND DUAL PALM BUTTONS

When the power supply is used with an actuator that incorporates a solenoid valve and a trigger switch, and the weld cycle is initiated by Branson Dual Palm Button set, proceed as follows:

- a. Mount a MS 3102-18-12P connector (EDP-200-029-022) to the actuator.
- b. Connect the center lead of a RG-58U co-axial cable to Pin "E" of the connector.
- c. Connect the shield from the co-axial cable to one of the connector mounting screws (ground), and to Pin "D" of the connector.
- d. Connect the BNC connector of the co-axial cable to the converter.
- e. Connect the actuator trigger switch to Pin "A" and "B" of the connector.
- f. Connect one of the solenoid valve wires to Pin "C" of the connector.
- g. Connect one side of the solenoid valve voltage source to Pin "F" of the connector.
- h. Connect the other wire from the solenoid valve directly to the other side of the solenoid valve voltage source.

NOTE

*Although the relay contacts which activate the solenoid valve are rated at 1 Amp., it is recommended that the current does not exceed 100 milli-amps.*

### 3-2 USE WITH ACTUATOR AND DUAL PALM BUTTONS (continued)

- i. Connect the power supply 7 pin connector to the actuator using cable (EDP 100-146-989).
- j. Connect the Dual Palm Button Switch (EDP 100-146-415) to the power supply 6 pin connector.

### 3-3 USE WITH ACTUATOR AND AUTOMATIC WELD CYCLE

When the power supply is used with an actuator that incorporates a solenoid valve and a trigger switch and the weld cycle is initiated automatically as on a rotary table, etc., proceed as follows:

- a. Mount a MS 3120-18-12P connector (EDP 200-029-022) to the actuator.
- b. Connect the center lead of an RG-58U co-axial cable to Pin "E" of the connector.
- c. Connect the shield from the co-axial cable to one of the connector mounting screws (ground), and to Pin "D" of the connector.
- d. Connect the BNC connector of the co-axial cable to the converter.
- e. Connect the actuator trigger switch to Pin "A" and "B" of the connector.
- f. Connect one of the solenoid valve wires to Pin "C" of the connector.
- g. Connect one side of the solenoid valve voltage source to Pin "F" of the connector.
- h. Connect the other wire from the solenoid valve directly to the other side of the solenoid valve voltage source.

#### NOTE

*Although the relay contacts which activate the solenoid valve are rated at 1 Amp., it is recommended that the current does not exceed 100 milliamps.*

- i. Connect the power supply 7 pin connector to the actuator using cable (EDP 100-146-989).



### 3-3 USE WITH ACTUATOR AND AUTOMATIC WELD CYCLE (continued)

- j. The cycle initiation switch on the automated machine must be double pole. Mount this switch in the appropriate place on the machine and wire as follows, using Branson cable (EDP 100-146-412). (Wire colors may vary with different cable manufacturers. It is recommended that the appropriate wires are located with an ohmmeter, continuity tester or a buzzer.)
  1. Connect the two common poles of the double pole switch together and to the wire coming from Pin "B" of cable (EDP 100-146-412).
  2. Connect the wire coming from Pin "C" of the connector to one side of the normally open switch.
  3. Connect the wire coming from Pin "D" of the connector to the other side of the normally open switch.
  4. Connect the wires coming from Pins "A" and "F" of the connector to the normally closed contacts of the Emergency Stop Switch.
  5. Connect the cable to the 6 pin connector on the power supply.

### 3-4 USE WITH SYSTEM WITHOUT A SOLENOID VALVE

When the power supply is used in a system without a solenoid valve, and it is permissible to trigger sonics immediately without a cycle initiation switch, proceed as follows:

- a. Connect converter to the 7 pin connector on power supply using Branson cable (EDP 100-146-557).
- b. Mount a single pole switch in an appropriate place on the machine.
- c. Using Branson cable (EDP 100-146-559), connect the shield of this cable and the green wire to the frame of the machine.
- d. Using an ohmmeter, continuity tester, or buzzer, locate the wire coming from Pin "B" of cable (EDP 100-146-559) and connect to one terminal of the normally open side of the switch.
- e. Locate the wire coming from Pin "C" and connect to the other terminal of the normally open side of the switch.

### 3-4 USE WITH SYSTEM WITHOUT A SOLENOID VALVE (continued)

#### NOTE

*Cable (EDP 100-146-559), may be a 4 conductor cable, if so, one wire (usually RED) is not used and should be cut off.*

- f. Connect the cable to the three pin connector on the power supply.

### 3-5 TUNING THE POWER SUPPLY

Plug line cord into electrical outlet.

#### NOTE

*The power supply must be tuned to the converter with which it is to be used. This must be repeated each time the converter, or tip is changed.*

Tune the power supply as follows:

1. Ensure that the horn tip does not contact anything.
2. Rotate Output Control fully clockwise.
3. Set ON-OFF-TEST switch to TEST, and while holding switch down, rotate tuning control for lowest reading on loading meter.
4. Release ON-OFF-TEST switch.
5. Set Output Control and Weld Time to desired setting.

#### NOTE

*When connected as in Paragraph 3-2 and 3-3 simultaneous closure of the PB-6 palm buttons will cause activation of the solenoid relay contacts, switching on the external solenoid valve. As the horn is brought into welding position, the sonic trigger switch should be closed and kept closed. The programmer in the power supply will activate the ultrasonic weld cycle. Upon completion of the weld cycle, the solenoid relay will de-activate, allowing the horn to return to the standby position. The power supply will re-set as soon as the trigger switch is opened.*

When connected as in Paragraph 3-4, sonics will be triggered immediately with the closure of the trigger switch. Sonics will remain on for the time set on the weld potentiometer or until the trigger switch is opened, whichever occurs first.

### 3-6 OPERATING INSTRUCTIONS

#### CAUTION

1. High voltage is present in the power supply. Do not operate with cover off.
2. When ultrasonic energy is applied to the workpiece, the part may oscillate at a frequency within the audible range and with enough intensity to warrant ear protection. (See Appendix for listing of manufacturers of hearing protectors).

1. Set ON-OFF-TEST switch to ON.

#### NOTE

*Once the parts to be welded have been designed, the holding fixture fabricated, and the converter and welding tip selected, variables such as tip amplitude, pressure, and weld time must be optimized to obtain satisfactory repeatable results in the minimum amount of time. Generally, starting conditions are:*

*Output Control Setting: 100%*

*Pressure: 2-3 lbs. hand pressure (HG-152)  
10-15 lbs. as set on actuator.*

*Weld Time: 1.0 second*

### 3-6 OPERATING INSTRUCTIONS (continued)

2. Weld a few parts and check for whatever desired properties are sought. Based upon the type of weld obtained, any combination of variables (amplitude, weld time and pressure), can be altered to obtain the desired results. Only one variable should be changed at a time until a satisfactory weld is obtained in the minimum amount of time.

## SECTION 4 MAINTENANCE

### 4-1 GENERAL

Unless the maintenance specialist is familiar with the equipment's physical makeup and operational characteristics, it is recommended that assistance be obtained from the local Branson Sonic Power Field Office. In lieu of such local office, contact the Product Support Department, in Danbury, Connecticut.

### 4-2 PARTS LOCATION

Figures 4-1 show the location of components referred to in this section.

### 4-3 SCHEMATIC DIAGRAM

Schematic diagram, Figure 4-2, is included to aid maintenance personnel in troubleshooting the equipment.

### 4-4 RESISTANCE CHARTS

The following charts are supplied as an aid in localizing trouble within the power supply. In the event of abnormal indication, they diagnose the symptoms and list which assembly might be responsible for the failure. When using Troubleshooting Charts A through F, check meter for proper range and polarity and observe the following:

1. All measurements made with Simpson VOM Model 260. Resistance measurements made with other meter will not correspond to those specified.
2. Infinite resistance readings may be obtained after some charge up time.
3. All readings  $\pm$  20%.
4. All plugs removed from board.

DIODES D25  
D26 MOUNTED  
NEAR CONNECTOR

RELAY BOARD  
WITH CR4 RELAY  
MOUNTED HERE

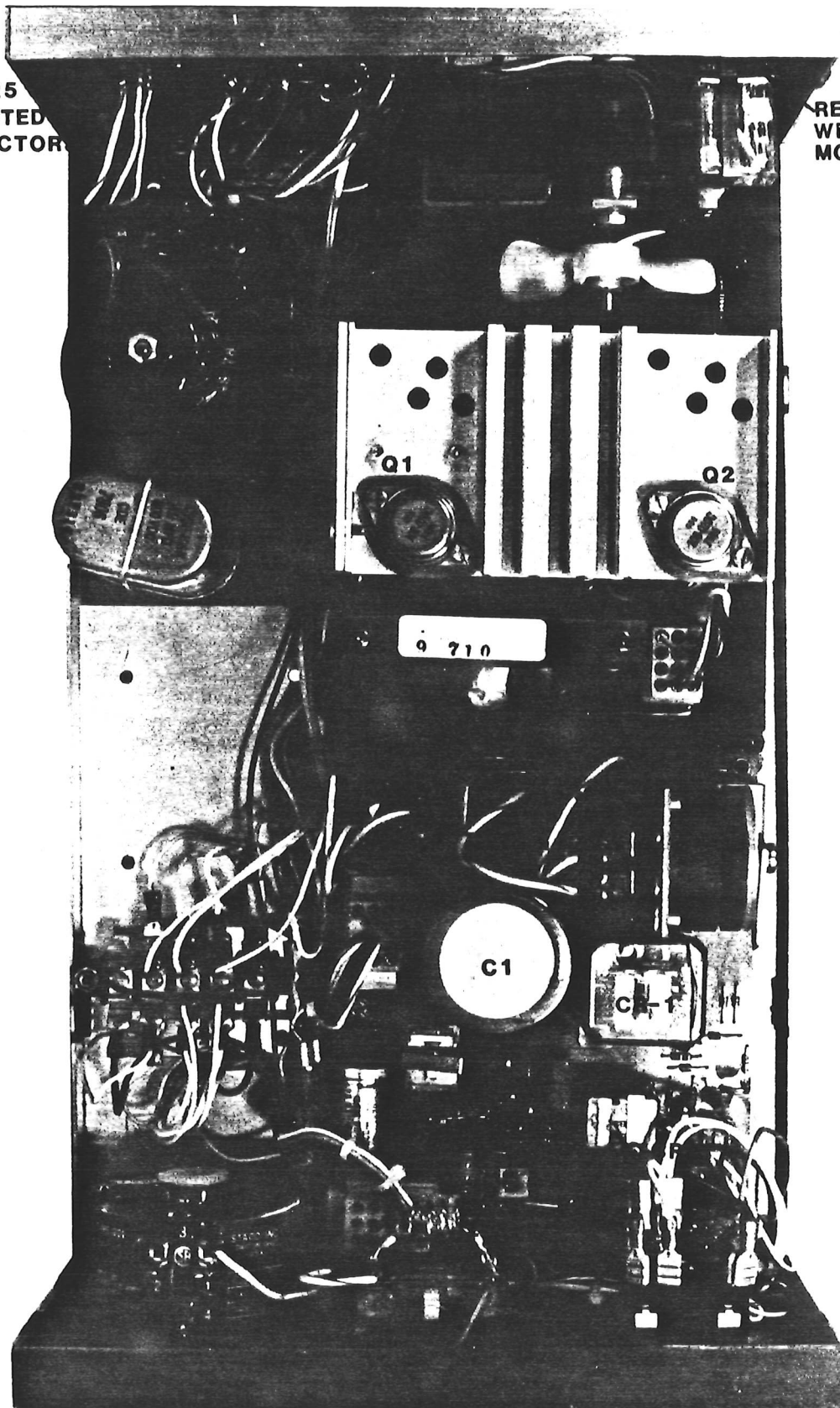


Figure 4-2 Parts Location Photograph





FIGURE 4-2



E-150B POWER SUPPLY  
ELECTRICAL PARTS LIST

<u>REFERENCE</u> <u>DESIGNATION</u>	<u>DESCRIPTION</u>	<u>BRANSON</u> <u>EDP NO.</u>
B1	Fan Motor	100-069-001
Fan Blade	(Not supplied with B1) 3-½" dia.	200-005-012
C2	Capacitor 5mf, 450V	200-016-170
C3	Capacitor 550 mf, 200V	200-016-104
CR1	Relay KUP 11A15	200-084-005
CR2, CR3	Relay R10-E1-Y2-J2.5K	200-084-031
CR4	Relay	200-084-049
Relay Board	Includes Relay CR4	100-146-984
D1	Diode, bridge	200-035-024
F1	Fuse, 4 Amp	200-049-009
Fuse Holder		200-050-001
J1	Connector-MS 3102A-16S-1S	200-029-087
J2	Plug-Molex 15 Pin #1375P	200-080-010
J3	Plug-Molex 12 Pin #1360P	200-029-081
Pins for J2, J3, J6, J6, J8	Pins - Molex #1376	200-103-061
J4	Connector MS 3102-16S-5S	200-029-018
J7	MS 3102A-14S-6S	200-029-085
L1	Tuning Assembly	100-146-246
M1	Meter	100-068-006
P/L	Pilot Light	200-011-007
P2	Receptacle-Molex #1375R	200-082-003
P3, P5	Receptacle - Molex #1360R	200-082-004
P6	Receptacle - Molex #1396R1	200-082-005
P8	Plug - Molex 6 pin	200-082-006
Pins for P2, P3, P5, P6, P8	Pins - Molex #1381	200-103-031
Q1, Q2	Transistor 108-020	100-108-020
R1	Resistor - Meter Shunt	100-173-013
R2	Potentiometer	100-086-014
S1	Switch ON-OFF-TEST	200-099-049
S7	Thermo Switch A762	200-099-031
T3	Variac Assembly	100-146-553
T4	Transformer 100V/250V (Export)	100-107-033
W1	Line Cord	200-030-003
Line Filter	FCC/VDE Universal Line Filter	100-146-724
E-150 Module	Complete Internal Module	100-146-534
1/4 oz. Tube	Silicone Grease	101-053-002
D25, D26	Diode, IN4006	200-035-042

TABLE 4-1. SYSTEM TROUBLE ANALYSIS CHART

NOTE

*With no cables attached to the power supply, a reading of approximately 30 on loading meter will indicate that the power supply is operating satisfactorily. If reading is higher than 30, check troubleshooting Chart A for failed transistor and troubleshooting Chart B for failed diode bridge rectifier.*

*To check converter, connect converter to power supply. A reading of approximately 10 in the TEST mode with the power control at maximum and the unit properly tuned, will indicate that the converter is operating satisfactorily.*

*To check cable, use Ohmmeter. Continuity should exist between connector pin "D" and BNC connector center pin, and between connector pin "E" and BNC connector (ground).*

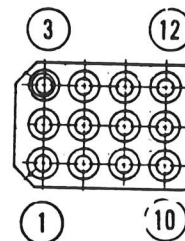
SYMPTOM	PROBABLE CAUSE OF ABNORMAL INDICATION
Main power fuse or circuit breaker fails when power supply is plugged in. Switch is in the OFF position	<ol style="list-style-type: none"> <li>1. Line cord is shorted.</li> <li>2. Line filter has failed.</li> </ol>
Main power fuse or circuit breaker fails during operating cycle.	<ol style="list-style-type: none"> <li>1. Underrated fuse or circuit breaker.</li> </ol>
Power ON/OFF indicator fails to illuminate when on-off switch is energized.	<ol style="list-style-type: none"> <li>1. Light has failed.</li> <li>2. Unplugged power supply</li> <li>3. Line cord has failed.</li> <li>4. Line filter has failed.</li> <li>5. Switch S1 has failed.</li> <li>6. Fuse F1 has failed.</li> <li>7. Transformer T3 has failed.</li> <li>8. Transformer T4 has failed.</li> <li>9. Accessory equipment has failed.</li> </ol>

TABLE 4-1 SYSTEM TROUBLE ANALYSIS CHART (continued)

SYMPTOM	PROBABLE CAUSE OF ABNORMAL INDICATION
Fuse F1 fails.	<ol style="list-style-type: none"> <li>1. Underrated fuse F1.</li> <li>2. Incorrect voltage</li> <li>3. Transformer T3 and T 4 have failed.</li> <li>4. Diode bridge rectifier D1 has failed. (See Chart B).</li> <li>5. Capacitor C1 has failed.</li> <li>6. Power supply failed.</li> <li>7. Transistor has failed. (See Chart A).</li> <li>8. Accessory equipment has failed.</li> <li>9. Fan has failed.</li> <li>10. Fan motor B1 has failed.</li> </ol>
Power ON/OFF indicator illuminates but fan does not operate.	<ol style="list-style-type: none"> <li>1. Fan motor B1 has failed.</li> </ol>
Ultrasonic power is delivered to the horn. No indication on meter.	<ol style="list-style-type: none"> <li>1. Meter M1 has failed.</li> </ol>
No or inconsistent ultrasonic power. Power supply tuning is difficult.	<ol style="list-style-type: none"> <li>1. Thermo switch is activated.</li> <li>2. Power supply is improperly tuned.</li> <li>3. Accessory equipment is improperly adjusted.</li> <li>4. Power control is improperly adjusted.</li> <li>5. Converter has failed.</li> <li>6. R. F. cable has failed.</li> <li>7. Transistor has failed. (See Chart A).</li> <li>8. Power supply failed.</li> <li>9. Tuning assembly has failed.</li> <li>10. Relay CR-2 has failed.</li> </ol>
Power supply operates when switch is in TEST position, but does not operate when switch is in ON position.	<ol style="list-style-type: none"> <li>1. Cable to trigger switch has failed.</li> <li>2. ON/OFF/TEST switch has failed.</li> <li>3. Trigger switch is improperly adjusted or has failed.</li> <li>4. Relay CR-4 has failed.</li> </ol>
Converter is warm.	<ol style="list-style-type: none"> <li>1. Power supply operates at more than 50% duty cycle.</li> <li>2. Converter tip is loose (should be torqued at 90 inch/lb. (<math>10 \pm 0.6</math> newton-meters))</li> </ol>
A slight electrical shock is felt when touching the unit.	<ol style="list-style-type: none"> <li>1. Power supply is improperly grounded.</li> <li>2. Line cord has failed.</li> </ol>

TABLE 4-2 RESISTANCE CHART A. HEATSINK ASSEMBLY

OHMMETER		POLARITY		RESISTANCE IN OHMS		REMEDIAL ACTION IF MEASUREMENT DOES NOT AGREE
		+	-	Rx	1 Scale	
1			2		infinite	Replace Q1 and Q2
2			1		infinite	
12			2		8 - 10 Ohms	
2			12		infinite	
12			1		8 - 10 Ohms	
1			12		infinite	
1			3		infinite	Replace Q1 and Q2
3			1		infinite	
10			1		8 - 10 Ohms	
1			10		infinite	
10			3		8 - 10 Ohms	
3			10		infinite	
6			9		zero Ohm	Replace Thermo Switch

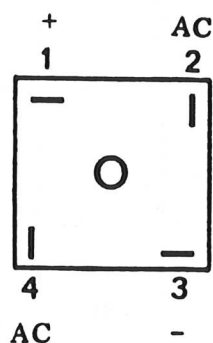


Ensure meter function switch is set to + D. C.



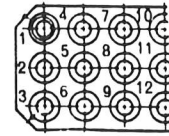
TABLE 4-3 RESISTANCE CHART B. DIODE BRIDGE RECTIFIER

OHMMETER POLARITY		RESISTANCE SCALE	RESISTANCE IN OHMS	REMEDIAL ACTION IF MEASUREMENTS DO NOT AGREE
+	-			
1	3	RX100	7.5 K Ohms	If resistance is low check Heatsink, Chart A, and check capacitor across bridge.
2	1	RX1	8 - 10 Ohms	Replace Bridge Rectifier D1
1	2	RX1	infinite	
4	1	RX1	8 - 10 Ohms	
1	4	RX1	infinite	
3	2	RX1	8 - 10 Ohms	
2	3	RX1	infinite	
3	4	RX1	8 - 10 Ohms	
4	3	RX1	infinite	



## RESISTANCE CHART C

## CONNECTOR J2

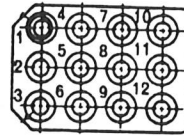


	+7	+9	+10	+12	+13	+15	
-7	0	47k	12k	68k		12k	
-9	33k	0	40k	100k		40k	
-10			0				
-12	175k	120k	200k	0		185k	
-13	15k	47k	22k	84k	0	22k	
-15	300k	330k	330k	370k		0	

Blank squares indicate infinite resistance.

## RESISTANCE CHART D

## CONNECTOR J3

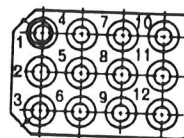


	+2	+3	+4	+6	+7	+10	+12
-2	0		5-13		5-13	5-13	
-3		0					5-13
-4			0	22k	0		
-6				0			
-7			0	22k	0		
-10				22k		0	
-12		330					0

Blank squares indicate infinite resistance.

# RESISTANCE CHART E

## CONNECTOR J5



	+1	+2	+3	6	9	10	12
-1	0						
-2	40k	0	15k			0	0
-3	25k	15k	0			10k	15k
6				0			
9					0		
10	8-15	30k	15k			0	30k
12	30k	0	15k			30k	0

Blank squares indicate infinite resistance.

# RESISTANCE CHART F

## CONNECTOR J6



	+1	+2	+3				
-1	0	72k	38k				
-2		0	22k				
-3		135k	0				

Blank squares indicate infinite resistance.

#### 4-5 RETURN OF EQUIPMENT

Requests for information concerning repairs should be directed to the local Branson Sonic Power Field Office, or to our factory Repair Control Department. When it becomes necessary to return equipment, use the "Authorization to Return Equipment" form located on the following page. Usage of this form will insure proper handling and identification. The form should be completed according to the instructions printed on its' reverse side, and included with the equipment to be returned.

For equipment not covered by warranty, a purchase order should be forwarded to avoid unnecessary delay. Care should be exercised to provide adequate packing to insure against possible damage in shipment. General repairs should be returned by any convenient method. Priority repairs should be sent Air Freight. All transportation charges should be prepaid F.O.B. Danbury, Connecticut or local office if the work is to be completed at a Field Office site.

SECTION 5  
APPENDIX

5-1 TW-1, TW-2 AND TW-3 CONVERTERS

The TW-1 is a low gain converter used primarily for ultrasonic staking and small spot welding.

The TW-1 peak - to - peak amplitude is 75 Microns

The TW-2 is a high gain converter used for welding, staking, or swaging thermoplastics.

The TW-2 peak - to - peak amplitude is 125 Microns

The TW-3 is a very low gain converter used primarily for applications requiring very low amplitude.

The TW-3 peak - to - peak amplitude is 33 Microns

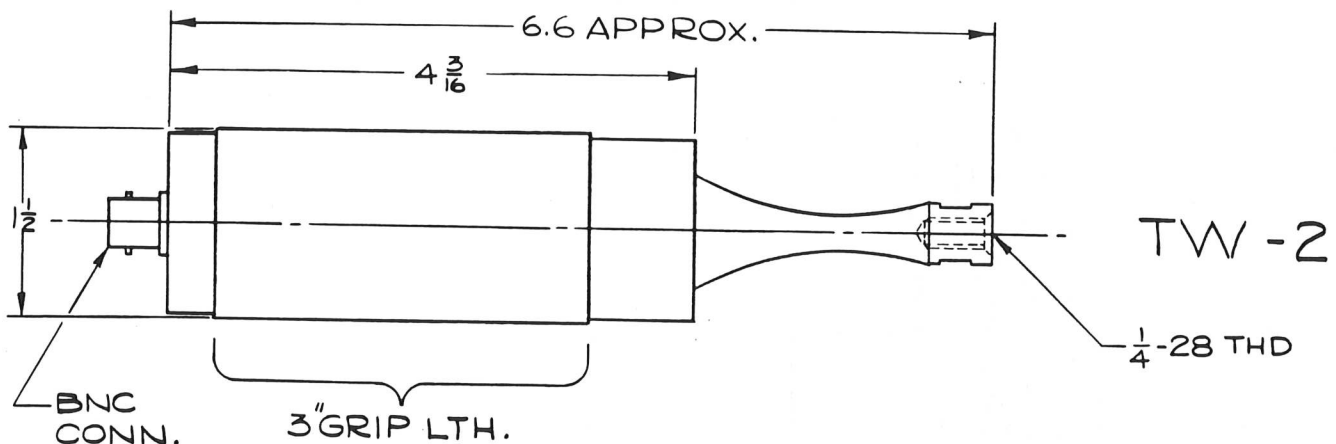


Figure 5-1

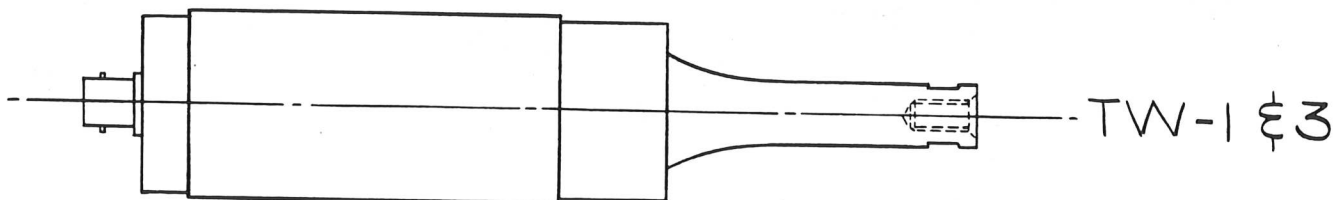


Figure 5-2

Branson EDP # TW1-101-135-015  
Branson EDP # TW2-101-135-016  
Branson EDP # TW3-101-135-031

## 5-2 PALM BUTTON SET ASSEMBLY

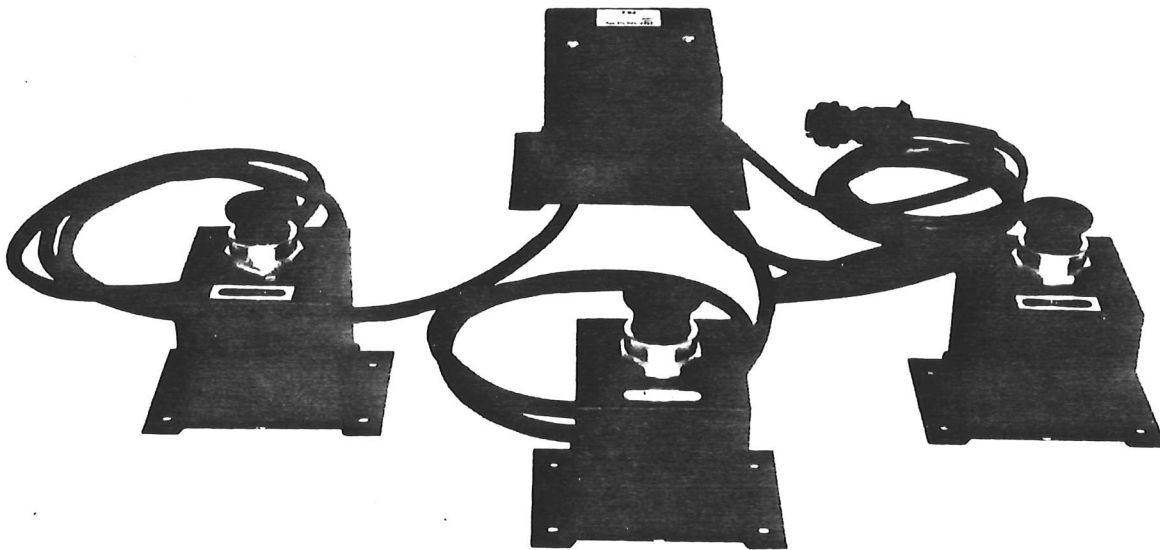


Figure 5-3 Palm Button Set Assembly Photograph

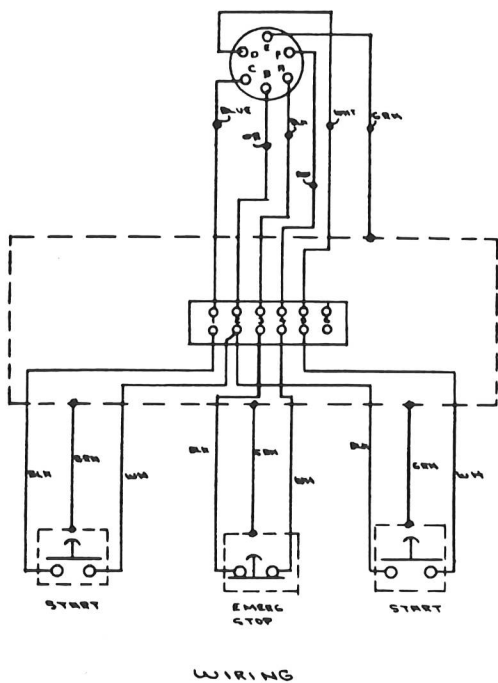


Figure 5-4 Wiring Diagram

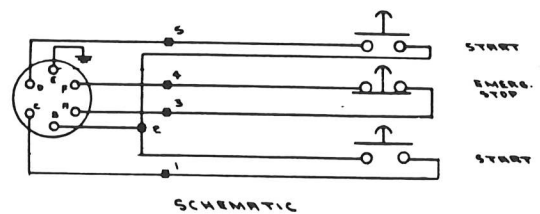


Figure 5-5 Schematic Diagram



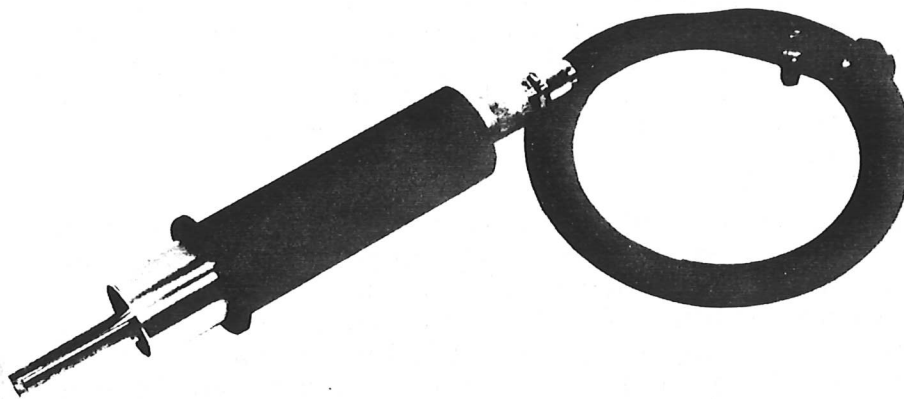


Figure 5-6 Model HG-152 Photograph

#### 5-4 GENERAL INFORMATION

The HG-152 is a compact, lightweight hand held welder, designed to effectively spot weld and stake a variety of thermoplastic materials.

The HG-152 extends the scope of ultrasonic assembly to areas inaccessible to conventional plastic welders. Such applications include assembly of parts too large to be transported to a conventional plastic welder, and parts with hard to reach joining surfaces.

#### 5-5 SPECIFICATIONS

Input Requirements:	Satisfied by the E-150B Ultrasonic Power Supply
Output Frequency:	20 kHz
Output Power:	150 Electrical watts
Duty Cycle:	50%
Dimensions:	
Grip Diameter:	2" (5cm)
Length:	10" (25.4 cm)
Cable Length:	8' (2.4m)
Weight:	2.2 lbs (1.0kg)

## 5-6 PRINCIPLE OF OPERATION

The E-150B power supply converts the line voltage to high frequency (20 kHz) electric energy which is used to drive the converter. The converter transforms the electrical energy to mechanical vibratory energy, and transmits these vibrations to the horn. When the horn contacts the part, localized heat is created between the horn and the top sheet and between the two sheets. The plastic melts, flows and form a permanent bond in split seconds.

The HG-152 is simple to operate. Weld time control and amplitude control are located on the power supply and once set, no further adjustments are required. The unit contains a pressure activated switch which energizes the power supply whenever the unit is pressed against the joining surfaces of the workpiece. Conversely, by lifting the unit away from the workpiece, the switch can override the weld time setting, and cause the power supply to de-energize.

The engagement force necessary to energize the welder is fixed on standard units to approximately 8 lbs at 1/8" travel. Travel can readily be changed from 0" to 5/32". At minimum travel, trigger pressure is reduced to approximately 7 lbs. Repeatable production results are obtained since the heat resulting at the interface is controlled and consistent. Automatic frequency control and automatic load compensation control circuitry keeps the power supply tuned throughout the welding cycle and eliminates the need for constant operator attention. To minimize operator fatigue when used on a production line basis, the HG-152 has provision for overhead suspension.

### NOTE

*When troubleshooting the HG-152, connect Ohmmeter to connector Pin "A" and "B" and press welding tip in order to activate switch. Proper operation of switch will be indicated by continuity.*

## 5-7 TIPS COMPATIBLE WITH THE HG-152

Refer to page 19 for a list of spot welding, staking, and knurled tips compatible with the HG-152.

5-8 ASSEMBLY AND DISASSEMBLY OF THE HG-152

- a. Slide converter (1) into housing (2).
- b. Secure converter in place by inserting retainer ring (3) in groove (4). The convex side of the ring should be oriented toward the converter. Recommended tools for ring insertion are Waldes Truarc standard assembly pliers #300, #304 (45 degree tip) or #309 (90 degree tip).
- c. Screw tip (5) snugly into converter ( $90 \pm 5$  inch/lb.-  
 $10 \pm 0.6$  newton-meters).

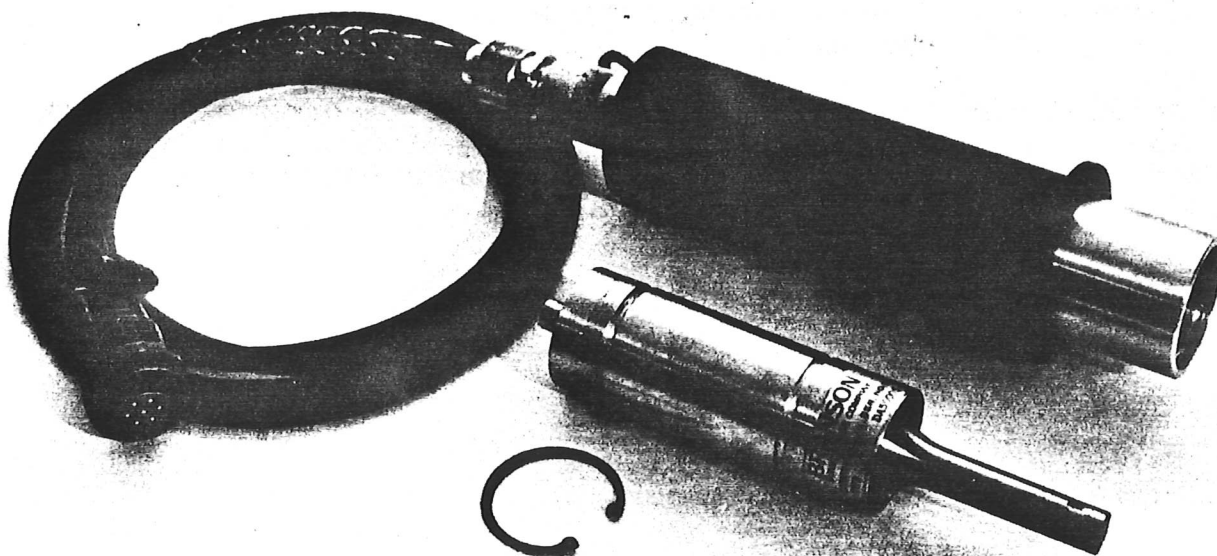


Figure 5-7 Model HG-152 Hand Gun (shown with converter)

## 5-9 SWITCH REPLACEMENT PROCEDURE

### NOTE

*Prior to replacing the switch, ensure that the power supply and converter are operational, and that travel before acutation has been adjusted to be approximately 1/8".*

Lack of sonics while the unit is depressed is indicative that the switch has failed. To replace the switch, observe the following:

- a. Using Waldes Truarc standard pliers #0600 or equivalent, remove retaining ring (7, Drawing 1) and pull converter out.
- b. Remove the three flat head screws (3, Drawing 1) and slide sleeve (2) off.
- c. Loosen lock nut (24, Drawing 2) and back out actuation pin to thread limit.
- d. Remove the four flat head screws (21, Drawing 2) from the inner sleeve (20, Drawing 2).
- e. Using a small diameter rod (8" to 10" long), push against the shoulder of the insulating block in (17, Drawing 2) in converter cavity close to the sleeve wall until the entire mechanism is out of the inner sleeve.

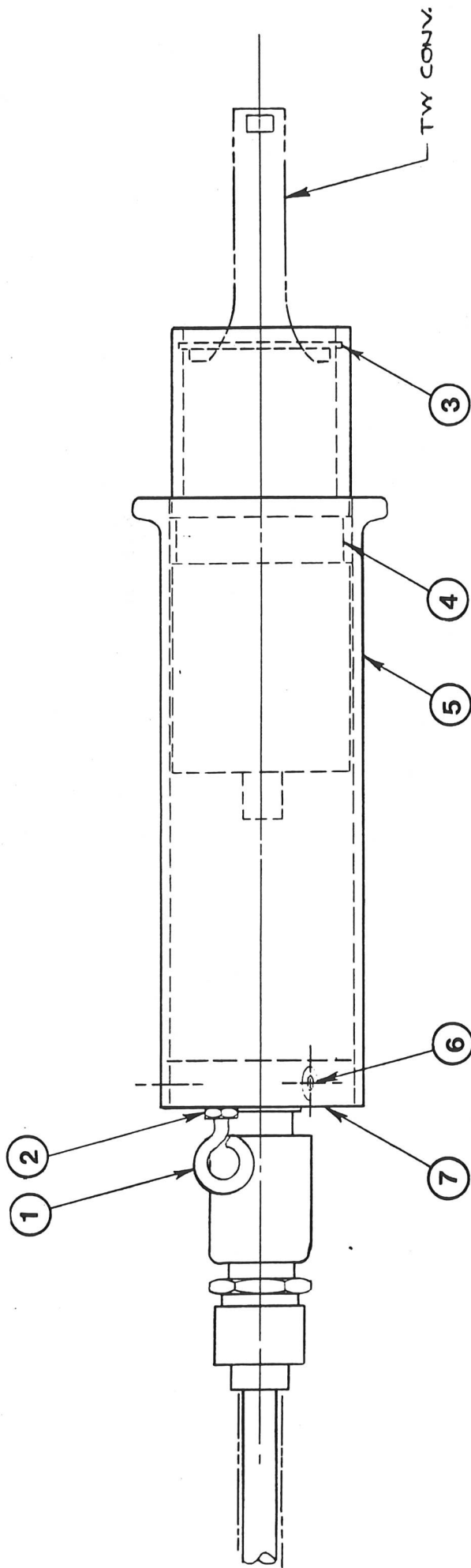
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### CAUTION

Do not pull the cable out or apply pressure to the BNC connector.

---

- f. Using Ohmmeter, check switch.
- g. If switch is defective, remove the two screws (16, Drawing 2) and un-solder the black and white wire from the switch.
- h. Solder black and white wire onto new switch (Branson EDP 200-099-097), (white to common and black to N.O.) and re-assemble in the reverse order of disassembly.



HG-152 BASIC ASSEMBLY

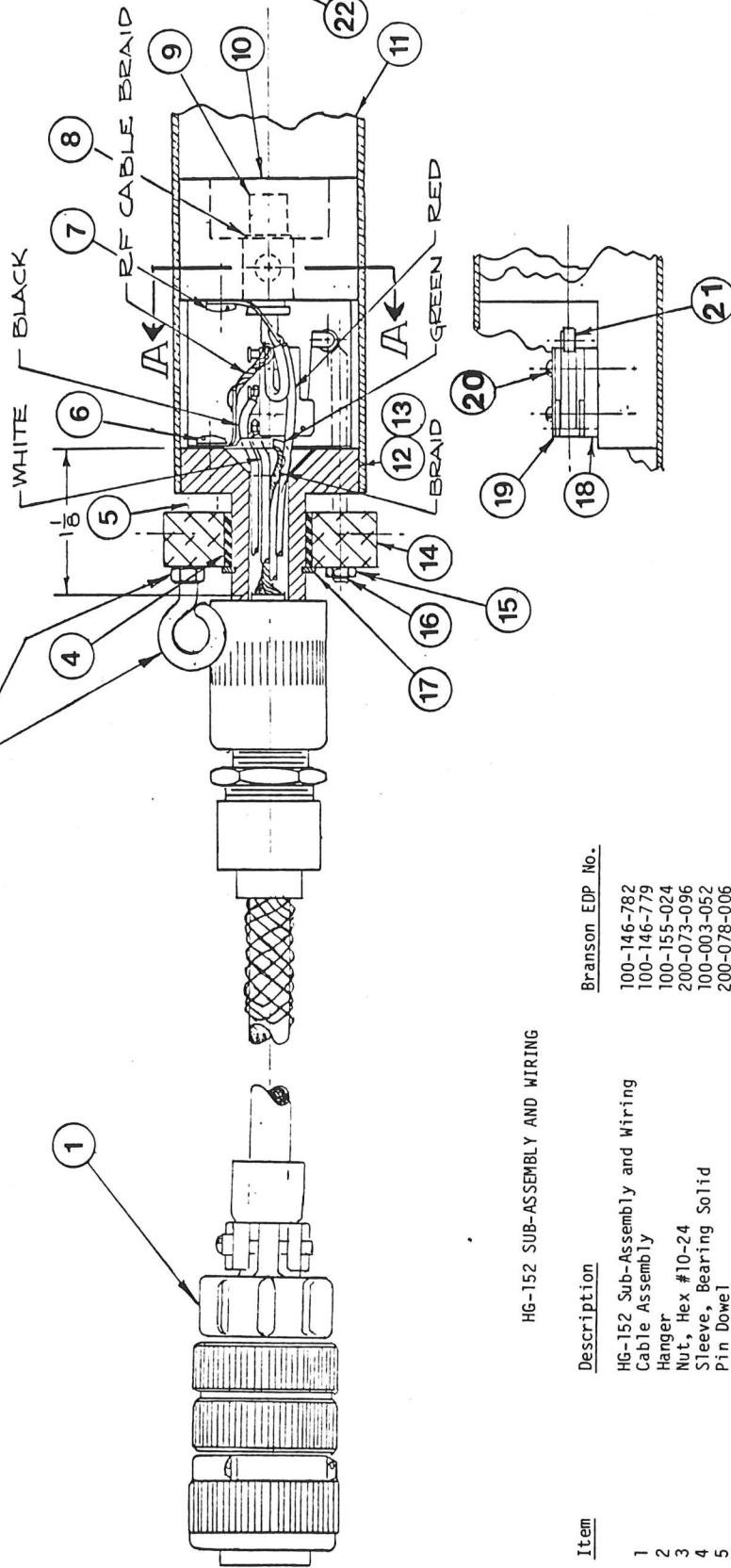
Item	Description	Branson EDP No.
1	*HG-152 Basic Assembly	101-136-005
2	Sub-Assembly and Wiring	100-146-782
3	Sleeve, Outer	100-092-025
4	Scr., Flt, Hex. Soc. Hed.	200-098-082
5	8-32 x 3/8 Lg.	100-155-024
6	Hanger	200-073-096
7	Nut, Hex #10-24	100-003-053
	Bearing, Sleeve Split	200-087-116
	Ring, Retaining	

HG-152  
BASIC ASSEMBLY  
DRAWING 1

\*Note: Refer to Branson Data Sheet PW-19 for additional ordering information.



2 3 - NOT SHOWN IN TRUE POSITION



SECTION A-A

HG-152 SUB-ASSEMBLY AND WIRING

Item	Description	Branson EDP No.
1	HG-152 Sub-Assembly and Wiring	100-146-782
2	Cable Assembly	100-146-779
3	Hanger	100-155-024
4	Nut, Hex #10-24	200-073-096
5	Sleeve, Bearing Solid	100-003-052
6	Pin Dowel	200-078-006
7	Screw, PAN HD. #6-32 x 1/4 Lg.	200-098-137
8	Screw, PAN HD. #6-32 x 1/4 Lg.	200-098-012
9	Ring, Retaining 5/16	200-087-011
10	BNC Conn./Cable Assy.	100-146-783
11	Block, Insulating	100-006-090
12	Housing Sleeve	100-092-024
13	Block, Guide	100-006-089
14	Spring	200-095-085
15	End, Sleeve Outer	100-006-092
16	Nut, Hex. #10 - 32	200-073-008
17	Pin, Actuation	100-078-051
18	Ring, Retaining 5/8	200-087-115
19	Block, Sw. Mtg.	100-006-091
20	Insulator	100-062-040
21	Screw, Bind. H.D. #2-56 x 5/8 Lg.	200-098-003
22	Switch, Sub. Min.	200-099-097
	Screw, FLT., HD. #6 - 32 x 3/8	200-098-065

HG-152 SUB-ASSEMBLY  
& WIRING

DRAWING 2





## 5-10 CABLE REPLACEMENT PROCEDURE (continued)

### DISASSEMBLY

- a. Follow Steps (a) through (e) of switch replacement procedure.
- b. Using Waldes Truarc standard pliers #0200 or equivalent, remove retaining ring holding BNC connector to insulating block.
- c. Remove from insulating block, RF solder lug attached to center white lead (co-ax cable to BNC connector).
- d. Remove from guide block the ground lug attached to twisted shield.
- e. Remove from guide block the ground lug attached to RF cable twisted shield.
- f. Remove metal strain relief from guide block.
- g. Remove guide block from cable.
- h. Loosen and remove metal strain relief and adaptor from cable.

### REASSEMBLY

- a. Slide metal strain relief, thread adaptor and guide block with outer sleeve end in place far enough onto the cable (8 foot cable with connector (Branson EDP 200-029-088), to allow leads to be free for soldering.
- b. Solder black lead to N.O. terminal on microswitch and white lead to COMMON terminal.
- c. Insert BNC connector into hole in insulating block and secure with snap ring (9, Drawing 2).
- d. Using screws (16, Drawing 2), secure microswitch to insulating block (17) with switch mounting block (12) under switch and insulator (15) on top of switch.
- e. Screw onto insulating block lugs soldered to cable (red lead) and BNC connector (white lead).

CAUTION

1. Do not overstress the cable leads during assembly and disassembly.
2. Maintain axial and radial relationship of guide block and insulation block.
3. To ease reassembly, ensure that screw holes in insulating block and guide block are aligned with countersunk holes in sleeve before re-insertion.

- f. Slide insulating block and guide block into housing sleeve and secure each with two flat head screws.
- g. Slide thread adaptor down the cable and secure to guide block.
- h. Assemble strain relief and secure to thread adaptor.
- i. Slide the outer sleeve (2, Drawing 1) and split bearing (6) over the assembly and secure with three screws(3).
- j. Adjust switch actuation pin location (7, Drawing 2) and secure with lock nut (24, Drawing 2).

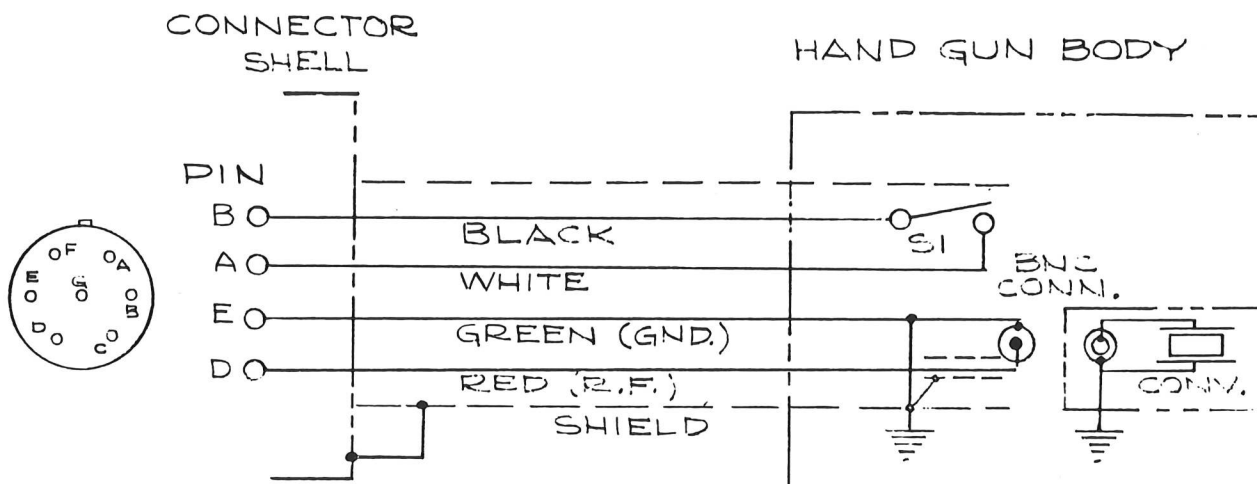


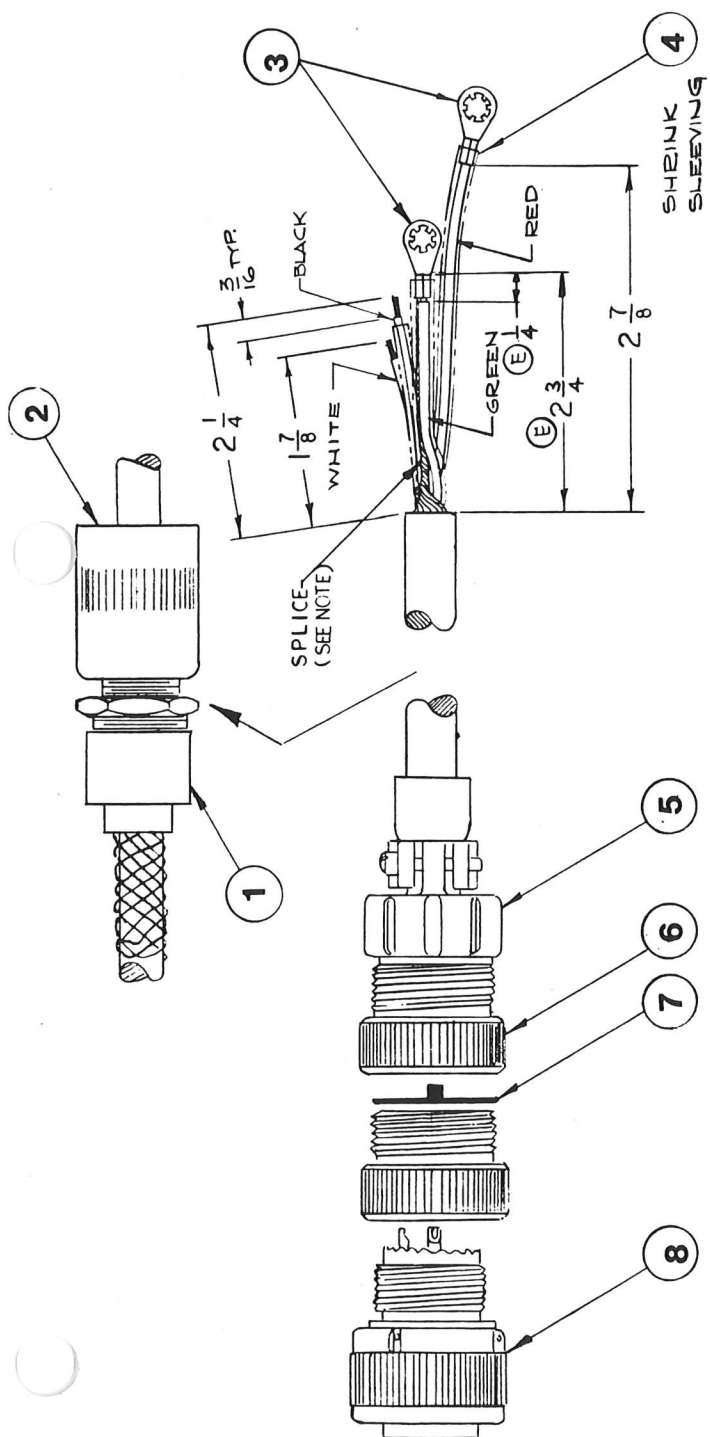
Figure 5-8 HG-152 Schematic Diagram

NOTE

*If the BNC connector is damaged and has to be replaced, follow Steps (a) through (e) of Switch Replacement Procedure and replace with BNC/cable assembly (Branson EDP 100-146-783). See Drawing 4.*

1. Use Waldes Truarc standard pliers #0200 or equivalent to remove the BNC connector from the insulating block.
2. Re-assemble in the reverse order of Steps (a) through (d) of the Switch Replacement Procedure.

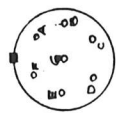
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PIN  
A D C D E F G

WIRE  
WHITE  
BLACK  
BLANK  
RED  
GREEN  
BLANK  
BLANK

USE  
SWITCH  
SWITCH  
B.F.  
GND.  
~  
~



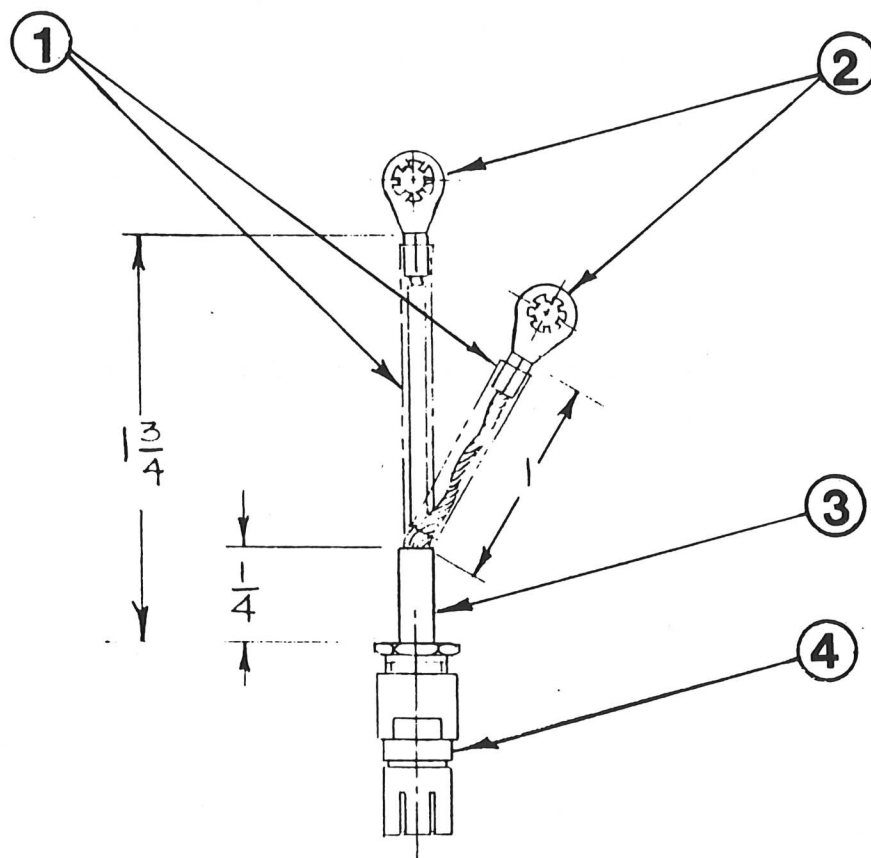
HG-152 CABLE ASSEMBLY

Item	Description	Branson EDP No.
1	HG-152 Cable Assembly	100-146-779
2	Cord Grip (Strain Relief)	200-012-058
3	Adaptor Thd. 5/8-24 to 3/8 NPT	100-121-029
4	Lug-Ground	200-103-074
5	Tubing Shrink 3/16 x 8" Lg.	200-110-035
6	Clamp W/Boot MS3057-8A	200-029-004
7	Adaptor Ctr. AN-9793-16	200-121-006
8	Ring-Bonding	100-087-034
	Connector MS3106A16S-1P	200-029-088

HG-152  
CABLE ASSEMBLY

DRAWING 3





BNC CONNECTOR/CABLE ASSEMBLY

<u>Item</u>	<u>Description</u>	<u>Branson EDP No.</u>
1	BNC Connector/Cable Assembly	100-146-783
2	Shrink tubing 3/16"	200-110-035
3	Lug	200-103-074
4	Cable	200-014-017
	Connector/BNC modified	100-029-174

BNC CONNECTOR/  
CABLE ASSEMBLY

DRAWING 4

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### SPOT WELDING TIPS

Code Letter	Material Thickness			Branson EDP#
	Inch	Inch	mm	
A	1/32	0.031	0.793	101-148-050
B	3/64	0.047	1.190	101-148-051
C	1.16	0.062	1.587	101-148-052
D	5/64	0.078	1.984	101-148-053
E	3/32	0.093	2.381	101-148-054
F	7/64	0.109	2.778	101-148-055

### STAKING TIPS

Code Letter	Profile	Stud Specifications				Branson EDP#
		Diameter		Length		
		Inch	mm	Inch	mm	
A	Standard	1/32	0.793	0.050	1.24	101-148-034
B	Standard	1/16	1.587	0.100	2.54	101-148-035
C	Standard	3/32	2.381	0.150	3.81	101-148-036
D	Standard	1/8	3.175	0.200	5.08	101-148-037
E	Standard	5/32	3.969	0.250	6.35	101-148-038
F	Standard	3/16	4.762	0.300	7.62	101-148-039
G	Low	1/32	0.793	0.019	0.49	101-148-040
H	Low	1/16	1.587	0.038	0.97	101-148-041
I	Low	3/32	2.381	0.056	1.42	101-148-042
J	Low	1/8	3.175	0.075	1.91	101-148-043
K	Low	5/32	3.969	0.094	2.34	101-148-044
L	Low	3/16	4.762	0.112	2.85	101-148-045

### KNURLED TIPS

Profile	Diameter mm	Branson EDP#
Male Fine	12.7	101-148-081
Male Medium	12.7	101-148-082
Male Coarse	12.7	101-148-083
Female Fine	12.7	101-148-084
Female Medium	12.7	101-148-085
Female Coarse	12.7	101-148-086

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# AUTHORIZATION TO RETURN EQUIPMENT

This document provides the authority to return the equipment listed below. Please fill out this form completely, using the instructions printed on the reverse side. This will expedite the repair and/or return of equipment.

TO: **BRANSON ULTRASONICS CORPORATION**  
**EAGLE ROAD**  
**DANBURY, CONNECTICUT 06810-1961**

FROM: \_\_\_\_\_

ATTENTION \_\_\_\_\_

DATE	CUSTOMER'S REFERENCE NUMBER	PERSON TO CONTACT	TELEPHONE NUMBER
------	-----------------------------	-------------------	------------------

1 INVENTORY OF RETURNED EQUIPMENT					2 REASON FOR RETURN	3 UNDER WARRANTY		4 REPAIR COSTS ARE AUTHORIZED NOT TO EXCEED: (DOLLAR AMOUNT OR % OF NEW ITEM)
ITEM	DESCRIPTION	MODEL NUMBER	EDP NUMBER	SERIAL NUMBER		YES	NO	
1								\$ OR %
2								\$ OR %
3								\$ OR %
4								\$ OR %
5								\$ OR %
6								\$ OR %
7								\$ OR %
8								\$ OR %
9								\$ OR %
10								\$ OR %

**REPAIR AUTHORIZATION:** BRANSON ULTRASONICS CORPORATION IS AUTHORIZED TO REPAIR EQUIPMENT LISTED ABOVE BUT NOT TO EXCEED A TOTAL OF ----->

OUR PURCHASE ORDER NO. \_\_\_\_\_ CUSTOMER'S AUTHORIZED SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

5 INSTRUCTIONS/COMMENTS \_\_\_\_\_

6 UPON COMPLETION OF REPAIRS BRANSON IS DIRECTED TO:

SHIP EQUIPMENT TO:

BILL TO

SPECIFIC SHIPPING INSTRUCTIONS

## FOR BRANSON ULTRASONICS CORPORATION'S USE ONLY

RECEIVED AT B.U.C. BY		DATE	COLLECT CHARGES	SHIPPING DAMAGE	SENT TO:
			\$	<input type="checkbox"/> YES <input type="checkbox"/> NO	
B.U.C. NO.	TERR. NO.	VALUE	DATE SCHEDULED		

## INSTRUCTIONS

This Authorization to Return Equipment form must accompany any equipment returned to Branson Ultrasonics Corporation by customers and field offices. Proper use of this document ensures minimum handling and greatly expedites the repair and/or return of equipment.

- (1) **Inventory of Returned Equipment:** List each item on a separate line (if necessary use more than one form).
- (2) **Reason for Return:** Use one of the following code numbers to indicate the reason you are returning the item(s):
  1. Repair
  2. Termination of rental
  3. Termination of consignment
  4. Returned for modification
  5. Returned for analysis
  6. Other - describe under section 5
  7. Credit
- (3) **Under Warranty?:** To the best of your knowledge, is this item still covered under Branson's Warranty?
- (4) **Repair Authorization:** By your purchase order authorizing a dollar limit per item or a percent of the cost of a new item as authorized repair limits, repairs may proceed immediately.
- (5) **Instructions/Comments:** Please use this space to describe any symptoms of equipment malfunction, or other special instructions.
- (6) **Shipping and Billing Instructions:** Please indicate fully and clearly the billing and shipping address(es).

## APPENDIX

### Manufacturers of Hearing Protectors

**AMERICAN OPTICAL COMPANY**  
Department 4634 F  
Southbridge, Massachusetts 01550

**BAUSCH AND LOMB**  
90302 Lomb Park  
Rochester, New York 14602

**BILSOM INTERNATIONAL, INC.**  
11800 Sunrise Valley Drive  
Reston, Virginia 22091

**EAR CORPORATION**  
376 University Avenue  
Westwood, Massachusetts 02090

**FLENTS® PRODUCTS CO., INC.**  
14 Orchard Street  
Norwalk, Connecticut 06850

**GLENDALE OPTICAL COMPANY, INC.**  
130 Crossways Park Drive  
Woodbury, L.I., NY 11797

**SELLSTROM MANUFACTURING COMPANY**  
Sellstrom Industrial Park  
Box 355  
Palatine, Illinois 60067

### Manufacturers of Sound Absorbing Material

**ANTIPHON, INC.**  
144 Benton Street  
Stratford, Connecticut 06497

**D. C. BELL COMPANY**  
1590 N. Kingsbury Street  
Chicago, Illinois 60022

**FERRO CORPORATION**  
Composites Division  
34 Smith Street  
Norwalk, Connecticut 06856

**GLOBE INDUSTRIES, INC.**  
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